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(54) **Vertical-channel junction field-effect transistors having buried gates and methods of making**

(57) Semiconductor devices and methods of making the devices are described. The devices can be implemented in SiC and can include epitaxially grown n-type drift and p-type trench gate regions, and an n-type epitaxially regrown channel region on top of the trench gate regions. A source region can be epitaxially regrown on top of the channel region or selectively implanted into the channel region. Ohmic contacts to the source, gate and drain regions can then be formed. The devices can include edge termination structures such as guard rings, junction termination extensions (JTE), or other suitable p-n blocking structures. The devices can be fabricated with different threshold voltages, and can be implemented for both depletion and enhanced modes of operation for the same channel doping. The devices can be used as discrete power transistors and in digital, analog, and monolithic microwave integrated circuits.

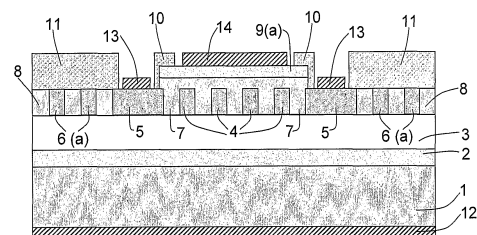


FIG. 1A

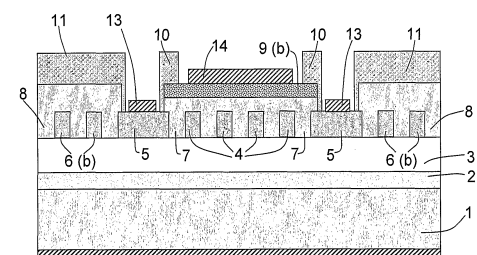


FIG. 1B



EUROPEAN SEARCH REPORT

Application Number
EP 11 18 9795

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A	WO 00/38246 A (SICED ELECT DEV GMBH & CO KG [DE]; TIHANYI JENOE [DE]; MITLEHNER HEINZ) 29 June 2000 (2000-06-29) * page 10, line 25 - page 19, line 10; figures 1-6 *	1-15	
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A	MIHALLA A ET AL: "Buried field rings - a novel edge termination method for 4H-SiC high voltage devices", SEMICONDUCTOR CONFERENCE, 2002. CAS 2002 PROCEEDINGS. INTERNATIONAL OCT. 8-12, 2002, PISCATAWAY, NJ, USA, IEEE, vol. 2, 1 January 2002 (2002-01-01), pages 245-248, XP010619485, ISBN: 978-0-7803-7440-9 * page 245 - page 246; figure 1 *	1-15	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 June 2013	Examiner Franche, Vincent
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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